

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

\$ / A

69169 U.S. PTO



08/07/97

RE:

Application of: TUROFF, C.

Docket # 76

For: FLUID-OPERATED POWER TOOL

August 7, 1997

Hon. Commissioner of
Patents & Trademarks
Washington, D.C. 20231

Please accept for filing as a new U.S. patent application the following documents which are submitted herewith:

- | | |
|--|--|
| 1. <u>X</u> Exp. Mail Cert. | 8. <u> </u> Priority Request |
| 2. <u>X</u> Specification and Claims | 9. <u> </u> Certified Copies |
| 3. <u> </u> Executed Declaration | 10. <u> </u> Information Disclosure
Statement & PTO 1449 |
| 4. <u> </u> Assignment & Recordation
Form | 11. <u> </u> Foreign Search Report
with translation |
| 5. <u> </u> Small Entity Statement | 12. <u> </u> Simultaneous Amendment |
| 6. <u>2</u> Sheet(s) of Drawings | 13. <u>X</u> Filing Fee |
| 7. <u> </u> Letter re filing without
signature + copy of
unsigned Declaration | 14. <u> </u> Other: <u> </u> |

08/07/97 08:07:00

Express Mail Number: **EH949843151US**

Date of Deposit: August 7, 1997

I hereby certify that this paper and the documents referred to herein are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Respectfully submitted,

Ingrid Springer

1997 AUG 7 10 04 AM '97

BE IT KNOWN that I, **C. Ross TUROFF**, have invented certain
new and useful improvements in

FLUID-OPERATED POWER TOOL

of which the following is a complete specification:

BACKGROUND OF THE INVENTION

The present invention relates to fluid-operated power tools.

Fluid-operated power tools, such as for example hydraulic torque wrenches, use a reaction element to react against a neighboring object. Such a reaction element can be formed as a reaction arm which is adjustable in several positions 360° around an axis of the cylinder-piston unit of the power drive. In the known power tool the reaction arm is provided with inner splines which cooperate with outer splines on the cylinder portion of the power drive. However, this has a substantial disadvantage. The outer splines of the cylinder portion in some instances abut themselves against a stationary object, such as for example a wall or the pipe, and the splines can get crushed. As a result, the reaction arm can not be mounted anymore for applications where the reaction arm abuts against an adjacent nut.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a fluid-operated power tool which avoids the disadvantages of the prior art.

5 In keeping with these objects and with others which will become apparent hereinafter, one feature of the present invention resides, briefly stated, in a fluid-operated power tool which has an engaging part with a turnable engaging element for engaging and turning a threaded connector, and a power drive part with a power drive operative for turning the engaging part, wherein the power drive part includes a fluid-operated cylinder-piston unit, said power drive part having an end spaced from said engaging part and provided with an inner opening with first connecting means; and a reaction member formed as a reaction arm which is turnable between a plurality of positions around an axis of said power drive part and fixable in each of said positions, said reaction arms having a projection which is insertable in said opening and being provided with second connecting means cooperating with said first connecting means so as to connect said reaction arm with said power drive part.

10

15

When the fluid-operated power tool is designed in accordance with the present invention, it eliminates the disadvantages of the prior art and provides for the above mentioned highly advantageous results.

The novel features which are considered as characteristic for the present invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a view showing a section of a fluid-operated power tool in accordance with the present invention;

Figure 2 is an end view of the inventive fluid-operated power tool of Figure 1; and

Figure 3 is a view showing a section taken along the line III-III in Figure 1.

DESCRIPTION OF PREFERRED EMBODIMENTS

A fluid-operated power tool in accordance with the present invention has a housing which is identified as a whole with reference numeral 1. The tool has an engaging part for engaging and turning a threaded connector such as a bolt, nut and the like. The engaging part has a drive plate 2 provided with an opening in which a ratchet 3 is rotatably supported and engaged by a pawl 4. An engaging projection 6 is provided in the ratchet 3 and supported in sleeves 5.

The fluid-operated power tool further has a power drive part with a power drive for turning the drive plate 2 with the ratchet 4, and thereby the ratchet 3, so as to turn the threaded connector. The power drive includes a cylinder 7 formed in the housing 1, a piston 8 movable in the cylinder, a pivotable slider 10 arranged at the left side of a piston rod of the piston 8 and cooperating with a curved surface of the drive plate 2, and a rod 11 which connects the piston rod of the piston 8 with the drive plate to pull the drive plate back. The right open end of the cylinder 7 of the power-drive part is closed by an end cap 12 having a projecting portion 9.

The fluid-operated power tool further has a reaction arm 13 with an opening in its upper part in Figure 1. A sleeve 14 is arranged in the

opening of the reaction arm and extends axially to the left in Figure 1. A portion of the sleeve 14 which extends axially outwardly beyond the reaction arm 1 and is provided with outer connecting means formed for example by a plurality of outer splines OS. In turn, a right end of the cylinder 7 is provided with an inner opening with a plurality of inner splines IS which in the mounted position interengage with the outer splines OS of the sleeve 14. As can be seen from Figure 1, the sleeve 14 has an inner opening 15 with which it is fitted on the projection 9 of the end plug, so that the reaction arm 13 as a whole can be held on the projection 9. Since the splines usually have a relatively loose fit, it is necessary to provide either a large diameter of the splines or a long length of the spline engagement, which however increases a total length of the tool. In contrast, in the applicants invention, the splines are short and at the same time have a small diameter. However, the internal guide formed by the projection 9 prevents side-loading of the splines and their early failure.

The locking mechanism is provided for retaining the reaction arm on the power drive part of the tool. The locking mechanism includes a depression provided in the projection 9 of the end cup and formed for example as a groove 16, and a slider 17 which is movable in a vertical direction in Figure 1 so as to engage in the depression or disengage from it. In the engaged condition the reaction arm 13 is reliably retained on the tool,

while in the disengaged condition when the slider 6 is displaced downwardly beyond the outer contour of the sleeve 14, the arm 13 can be removed from the tool. The engaged condition is obtained by a button 18 which is spring biased upwardly by a spring 19. In order to disengage the slider 17 from the depression 16, an operator presses the button 18 downwardly against the force of the spring 19.

In order to provide an abutment of the reaction arm against a neighboring object in any position, the reaction arm can be removed from the tool, turned by a desired angle, and again mounted on the tool by interengagement of the splines OS and IS, and then locked in this position.

While no inlet and outlet ports are shown for the cylinder-piston unit of the inventive tool, they are well known in the art. In operation when a pressure fluid is admitted into the cylinder 7, it displaces the piston 8 with the piston rod, which in turn turns the drive plate 2 with the pawl 4, and the pawl 4 turns the ratchet 3 and the projection 6 engaged with the threaded connector, so as to turn the threaded connector.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in fluid-operated power tool, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

5

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

CLAIMS

1 1. A fluid-operated power tool, comprising an engaging part
2 with a turnable engaging element for engaging and turning a threaded
3 connector, and a power drive part with a power drive operative for turning the
4 engaging part, wherein the power drive part includes a fluid-operated
5 cylinder-piston unit, said power drive part having an end spaced from said
6 engaging part and provided with an inner opening with first connecting
7 means; and a reaction member formed as a reaction arm which is turnable
8 between a plurality of positions around an axis of said power drive part and
9 fixable in each of said positions, said reaction arms having a projection which
10 is insertable in said opening and being provided with second connecting
11 means cooperating with said first connecting means so as to connect said
12 reaction arm with said power drive part.

1 2. A fluid-power tool as defined in claim 1, wherein said first
2 connecting means are formed as a plurality of inner splines, said second
3 connecting means being formed as a plurality of outer splines.

1 3. A fluid-power tool as defined in claim 1, wherein said
2 cylinder-piston unit has an axis, said opening and said projection having
3 axes which coincide with one another and with said axis of said cylinder-
4 piston unit.

1 4. A fluid-power tool as defined in claim 1; and further
2 comprising guide means provided in said power drive part, said projection
3 with said second connecting means being guided on said guide means.

1 5. A fluid-power tool as defined in claim 4, wherein said power
2 drive part has an open end, said guide means being formed as an end cap
3 closing said open end.

1 6. A fluid-power tool as defined in claim 5, wherein said
2 projection with said second connecting means has an inner opening and is
3 fitted with said inner opening on said end cap.

1 7. A fluid-power tool as defined in claim 6; and further
2 comprising means for locking said reaction arm on said end cap and
3 unlocking said reaction arm from said end cap, said locking end and locking
4 means including a depression formed in said end cap, a slider movable in
5 said reaction arm and engageable in said depression as well as
6 disengageable from said depression, and a button operatable by a user for
7 moving said slider into said depression and releasing said slider from said
8 depression.

2 8. A fluid-power tool as defined in claim 7; and further
3 comprising spring means which bias said button so as to move said slider
into said depression for locking.

ABSTRACT OF THE DISCLOSURE

A fluid-operated power tool has an engaging part with a turnable engaging element for engaging and turning a threaded connector, and a power drive part with a power drive operative for turning the engaging part, wherein the power drive part includes a fluid-operated cylinder-piston unit, the power drive part having an end spaced from the engaging part and provided with an inner opening with a first connection, and a reaction member formed as a reaction arm which is turnable between a plurality of positions around an axis of the power drive part and fixable in each of the positions, the reaction arms having a projection which is insertable in the opening and being provided with second connection with the first connection so as to connect the reaction arm with the power drive part.

COMBINED DECLARATION AND POWER OF ATTORNEY	ATTORNEY DOCKET NO.
---	---------------------

As a below-named inventor, I hereby declare that:

C. Ross TUROFF

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention.

FLUID OPERATED POWER TOOL

the specification of which:

(Check one) X is attached hereto.

___ was filed on _____ as

Application Serial No. _____ and

was amended on _____
(if applicable)

was amended through _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section § 119, of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):

Priority Claimed

Priority Number	Country	Date filed (Priority Date)	Yes	No
Priority Number	Country	Date filed (Priority Date)	Yes	No
Priority Number	Country	Date filed (Priority Date)	Yes	No

1970-1971	1971-1972	1972-1973	1973-1974	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982	1982-1983	1983-1984	1984-1985	1985-1986	1986-1987	1987-1988	1988-1989	1989-1990	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2028-2029	2029-2030	2030-2031	2031-2032	2032-2033	2033-2034	2034-2035	2035-2036	2036-2037	2037-2038	2038-2039	2039-2040	2040-2041	2041-2042	2042-2043	2043-2044	2044-2045	2045-2046	2046-2047	2047-2048	2048-2049	2049-2050	2050-2051	2051-2052	2052-2053	2053-2054	2054-2055	2055-2056	2056-2057	2057-2058	2058-2059	2059-2060	2060-2061	2061-2062	2062-2063	2063-2064	2064-2065	2065-2066	2066-2067	2067-2068	2068-2069	2069-2070	2070-2071	2071-2072	2072-2073	2073-2074	2074-2075	2075-2076	2076-2077	2077-2078	2078-2079	2079-2080	2080-2081	2081-2082	2082-2083	2083-2084	2084-2085	2085-2086	2086-2087	2087-2088	2088-2089	2089-2090	2090-2091	2091-2092	2092-2093	2093-2094	2094-2095	2095-2096	2096-2097	2097-2098	2098-2099	2099-2100	2100-2101	2101-2102	2102-2103	2103-2104	2104-2105	2105-2106	2106-2107	2107-2108	2108-2109	2109-2110	2110-2111	2111-2112	2112-2113	2113-2114	2114-2115	2115-2116	2116-2117	2117-2118	2118-2119	2119-2120	2120-2121	2121-2122	2122-2123	2123-2124	2124-2125	2125-2126	2126-2127	2127-2128	2128-2129	2129-2130	2130-2131	2131-2132	2132-2133	2133-2134	2134-2135	2135-2136	2136-2137	2137-2138	2138-2139	2139-2140	2140-2141	2141-2142	2142-2143	2143-2144	2144-2145	2145-2146	2146-2147	2147-2148	2148-2149	2149-2150	2150-2151	2151-2152	2152-2153	2153-2154	2154-2155	2155-2156	2156-2157	2157-2158	2158-2159	2159-2160	2160-2161	2161-2162	2162-2163	2163-2164	2164-2165	2165-2166	2166-2167	2167-2168	2168-2169	2169-2170	2170-2171	2171-2172	2172-2173	2173-2174	2174-2175	2175-2176	2176-2177	2177-2178	2178-2179	2179-2180	2180-2181	2181-2182	2182-2183	2183-2184	2184-2185	2185-2186	2186-2187	2187-2188	2188-2189	2189-2190	2190-2191	2191-2192	2192-2193	2193-2194	2194-2195	2195-2196	2196-2197	2197-2198	2198-2199	2199-2200	2200-2201	2201-2202	2202-2203	2203-2204	2204-2205	2205-2206	2206-2207	2207-2208	2208-2209	2209-2210	2210-2211	2211-2212	2212-2213	2213-2214	2214-2215	2215-2216	2216-2217	2217-2218	2218-2219	2219-2220	2220-2221	2221-2222	2222-2223	2223-2224	2224-2225	2225-2226	2226-2227	2227-2228	2228-2229	2229-2230	2230-2231	2231-2232	2232-2233	2233-2234	2234-2235	2235-2236	2236-2237	2237-2238	2238-2239	2239-2240	2240-2241	2241-2242	2242-2243	2243-2244	2244-2245	2245-2246	2246-2247	2247-2248	2248-2249	2249-2250	2250-2251	2251-2252	2252-2253	2253-2254	2254-2255	2255-2256	2256-2257	2257-2258	2258-2259	2259-2260	2260-2261	2261-2262
-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------

[illegible]

The undersigned hereby authorizes **Robert R. Brunelli** and the firm of **Sheridan Ross**, to accept and follow instructions from:

as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between Michael J. Striker, the firm of Striker, Striker & Stenby, and the undersigned. In the event of a change in the persons from whom instructions may be taken, Michael J. Striker and the firm of Striker, Striker & Stenby will be so notified by the undersigned.

Address all correspondence to: Sheridan Ross
Att.: Robert Brunelli
1700 Lincoln Street
Denver, Colorado 80203-4501
U.S.A.

FULL NAME OF SOLE OR FIRST INVENTOR:	INVENTOR'S SIGNATURE:	DATE:
C. Ross TUROFF		
RESIDENCE AND FULL POSTAL ADDRESS: 73 Troutbrook Road Monroe, NY 10950 USA		CITIZENSHIP: U.S.

Variable	Mean	SD	Min	Max
Age	30.5	4.2	22	45
Gender	0.5	0.5	0	1
Marital status	0.3	0.5	0	1
Education	12.5	1.5	10	16
Income	1500	500	500	3000
Health status	0.7	0.4	0	1
Smoking status	0.2	0.4	0	1
Alcohol consumption	0.1	0.3	0	1
Exercise frequency	0.5	0.5	0	1
Stress level	3.5	1.5	1	5
Sleep quality	0.6	0.4	0	1
Work satisfaction	0.4	0.5	0	1
Life satisfaction	0.5	0.5	0	1
Depression score	10	10	0	30
Anxiety score	12	12	0	30
Loneliness score	15	15	0	30
Self-esteem score	20	10	0	30
Resilience score	25	10	0	30
Optimism score	28	10	0	30
Gratitude score	30	10	0	30
Forgiveness score	32	10	0	30
Compassion score	35	10	0	30
Kindness score	38	10	0	30
Generosity score	40	10	0	30
Patience score	42	10	0	30
Humility score	45	10	0	30
Modesty score	48	10	0	30
Meekness score	50	10	0	30
Gentleness score	52	10	0	30
Mildness score	55	10	0	30
Docility score	58	10	0	30
Submissiveness score	60	10	0	30
Humility score	62	10	0	30
Modesty score	65	10	0	30
Meekness score	68	10	0	30
Gentleness score	70	10	0	30
Mildness score	72	10	0	30
Docility score	75	10	0	30
Submissiveness score	78	10	0	30
Humility score	80	10	0	30
Modesty score	82	10	0	30
Meekness score	85	10	0	30
Gentleness score	88	10	0	30
Mildness score	90	10	0	30
Docility score	92	10	0	30
Submissiveness score	95	10	0	30
Humility score	98	10	0	30
Modesty score	100	10	0	30

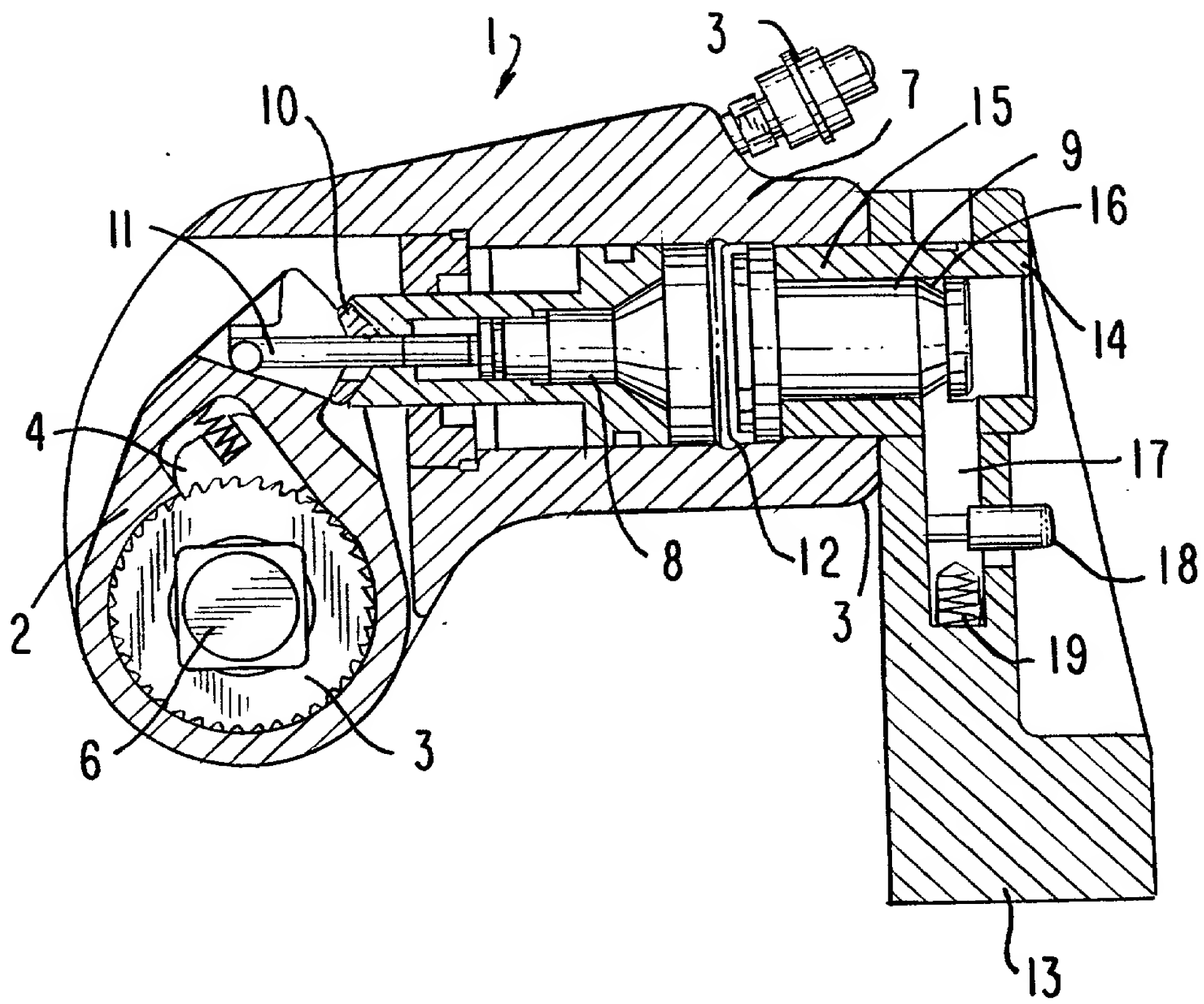


FIG. 1

